Forecasting Technology Impacts for Proactive Installation Management

By Dr. Ilker Adiguzel, Director, CERL

The Center for the Advancement of Sustainability Innovations last year began a series of studies to identify emerging challenges and opportunities for installations as new technologies are implemented. Funded by the Installation Management Command's Center for Future Installation Strategy, this effort identifies IMCOM drivers, assesses possible technology solutions, and forecasts potential impacts on military facilities and lands.

The pace of change is constantly accelerating – in part because of the remarkable advances in technology and the opportunities and unforeseen consequences of adopting them. Advancing information, medical, energy, transportation, material and other technologies not only have direct impacts on how military installations do business, but also change the circumstances of the surrounding communities. Moreover, in the wrong hands, new technologies can pose new threats to installations.

Technology forecasting is a tricky proposition. How many foresaw the game-changing impact of the internet in 1969, when it was developed by the Advanced Research Projects Agency, and of the worldwide web in 1989-90, when Sir Tim Berners-Lee developed the first web client and server? History is replete with examples of disruptive technologies and innovations: teletypes, telephones, paper, elevators, steamships, aircraft, rifled gun barrels, semiconductors, and overnight delivery, just to name a few. In retrospect, the importance of these advances is obvious. It is when trying to plan for the future that the proposition becomes more difficult. New technologies often solve today's problems, but may also create new challenges that assume overwhelming importance.

Adiguzel

Starting in 2009, the Army began purchasing large numbers of non-tactical electric vehicles for use on installations to stimulate growth of the alternative fuels automobile industry. How will the switch to these vehicles change infrastructure needs? Photo courtesy of U.S. Army.

CASI's first approach to installation technology futures forecasting makes use of a process called "Strategy Under Uncertainty" as reported in the Harvard Business Review (Nov-Dec 1997).

Shapers, Adapters, and Reservers

The study approach identifies three strategic postures that an organization can adopt in dealing with uncertainty: shaping, adapting, and reserving the right to play. The philosophy of a shaping posture is to drive a technology toward a form that is most useful to the shaper; this is often a goal of government policy, to influence technology development to serve the interests of an agency or the nation. An adapting posture allows a technology to take its own course, but the adapter seeks to be in a position to take advantage of the technology at the right time. Finally, reserving the right to play is similar to adapting, but uses small early investments to avoid missing the opportunity to use the technology at a later time.

The forecasting method also describes three types of actions: big bets, options, and no-regrets moves. Shaping often involves a big bet move, such as a large acquisition to promote advancement of a technology or investing in research and

development. For example, the Army announced in 2009 that it would lease more than 4,000 "Neighborhood Electric Vehicles" for use on Army installations from Global Electric Motorcars. This shaping effort is explicitly intended to help spur a commercial market for electric cars in the United States. Options may be used to adapt or reserve the right to play. Technology pilot tests, such as those conducted by the Technology Standardization Group's Installation Technology Transfer Program, are a form of option. A small investment is made to try out a technology before a major acquisition or policy decision is made. Finally, no-regrets moves are those that will result in some beneficial outcome, regardless of the success or failure of the technology. Upgrading and repairing infrastructure to support a possible future technology may pay off even if the technology is never acquired, such as upgrading electrical service in motor pools, where needed, in anticipation of requirements for electrical vehicles.

New vehicles and renewable energy

CASI first applied the forecasting approach to an installation's potential investment in alternative non-tactical vehicles: hybrid, electric, and hydrogen fuel cell types. The drivers to adopt this technology include several national priorities, such as the Energy Independence and Security Act of 2007 and Executive Order 13423.

CASI analyzed each vehicle type in terms of projected market share, power, pros and cons, and production examples. By being able to forecast the availability of these vehicles, IMCOM headquarters can incorporate changes into its funding processes and installations can begin planning for infrastructure changes to accommodate the NTVs.

The next topic studied under this process was energy security. In this study, CASI examined the planning and training needs for energy security managers, their access to critical infrastructure evaluations for their bases, and the recommendations of a 2009 Defense Science Board study on Energy Security. In addition, several energy security measures were evaluated, in terms of technology readiness, impacts on installation operations, and forecasts were provided as to when technologies such as microgrids, fuel cells, emerging battery options and renewable energy options would be available for use on installations. In making decisions about these technologies, IMCOM managers need to address issues such as the potential impacts these new energy infrastructures will have on the installation operations, training requirements, cost/benefit and value to the military missions,. Through strategic planning and energy modeling and simulation, costly sub-optimal decisions may be avoided.

A current study is now underway related to the application of Building Information Model (BIM) technology, now a standard for MILCON design, through the full building life cycle.

About CASI

The U.S. Army Engineer Research and Development Center established CASI at its Construction Engineering Research Laboratory in 2006 to focus the value of ERDC expertise, technologies and partnerships toward helping the Corps of Engineers, the Army and the Department of Defense achieve more sustainable facilities and operations. CASI aims to contribute toward the objective of sustainability, providing the military with capabilities that enhance national security through more effective use of limited resources and through improved coordination and partnerships with host communities and stakeholders in the U.S. and across the globe.

POC: William.D.Goran@usace.army.mil, CASI Director, 217-373-6735.